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ABSTRACT

Recall data from eight eleventh-grade students were analyzed to determine the effects of writing tasks on recall of content and relationship units at three levels of importance in the content structure of 21 prose passages. The data were colelcted as part of an earlier study of the effects of three writing tasks (notetaking, answering study questions, and analytic essay writing) on learning information from prose passages. The results of the two studies showed that the level of importance and the interaction of highest level and essay writing enhanced the recall of those relationship units. An abbreviated prose passage is provided as a sample, as well as examples of prompts and student responses for the three writing tasks. (HTH)

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Recalling Important Information in Text:

An Examination of Learning While Writing

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Running Head: Learning While Writing

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Abstract

While writing researchers have claimed that composing fosters learning, we need to develop a more rigorous conceptualization of the effects of various writing functions on learning. This paper reports the results of an analysis of recall data collected as part of a study that examined the effects of three writing tasks (notetaking, answering study questions, and analytic essay writing) on learning information from prose passages. Specifically, the analysis investigated the effects of task on recall of content and relationship units at three levels (high, middle, low) of importance in the content structures of the prose passages. Results indicated that the highest level of importance and the interaction of highest level and essay writing enhanced the recall of relationship units.

Recalling Important Information in Text: An Examination of Learning While Writing

Recent discussions of writing as a higher order thinking process (Smith, 1982; Graves, 1983; Flower & Hayes, 1984) agree that writing contributes to writers' understanding. However, there is very little empirical research from which to conceptualize how writing may aid learning about the topic. While research on the composing process (Humes, 1983) has claimed that essay writing leads to learning about the topic, the research has only examined the thinking process entailed in writing at the exclusion of studies of how the process and the product are related (Applebee, 1984; Langer, 1984a; Newell, 1984). Research in prose learning (Anderson & Biddle, 1975; Andre, 1979; Reder, 1980; Rickards, 1979) suggests that manipulation (as in taking notes or answering questions) of the information being studied tends to improve recall, and that improvement is closely related to the type of manipulation. However, the kinds of complex writing tasks (essay writing) used in studies of the composing process differ greatly from the more simple forms of writing (answering study questions and notetaking) used in prose learning research. Consequently, there

is need for a more rigorous conceptualization of the effects of various functions of writing, especially the analytic essay, on learning (Applebee, 1984).

In order to explore the effect of various functions of writing on learning, this paper reports an analysis of recall data collected as part of a study of learning from writing (Newell, 1984). Using level of importance as a variable that influences what is learned from text (Meyer, 1977; Kintsch, 1974), the analysis demonstrates that when students write analytic essays about information in prose passages, they are more likely to retain the most rather than the least important information in the passages.

The Initial Study

The study (Newell, 1984) investigated writing as a means of advancing students' understanding of subject-area concepts using Langer's (1984b) measure of organization of concept knowledge and learning from texts as measured by recall of information and concept application. As a measure of comprehension, students did immediate written recalls of the passages. (See Figure 1 for synopsis of a prose passage.) To demonstrate the effects of various writing tasks on learning from text, both the product and the process of writing were examined. Two general questions were

the focus of that study: (1) what are the effects of notetaking, short answer study questions, and analytical essay writing on passage recall, organization of passage-relevant knowledge, and the ability to apply concepts in a new context; and (2) what are the effects of the three writing tasks on the composing and learning operations that students engage in? (See Figure 2 for an example of a prompt and a student response for each task.) Eight eleventh grade students, four girls and four boys, participated in the study. Writing sessions were conducted in the following order: the student read a prose passage, completed a writing task while composing aloud , wrote a recall of the passage, repeated the knowledge measure, and took a test of concept application.

Students' concept knowledge was measured by adapting procedures from Langer (1984b). The students' ability to apply concepts to a new context was measured with open-ended questions which required paragraph-length responses. T se responses were scored holistically for elaboration and correctness. As a measure of what they comprehended, the students did an immediate written recall of the passages. Each recall protocol was scored for the presence or absence of the content units and relationship units in the content structure

(Meyer, 1975).

While results indicated that task had no significant main effect on general recall of the prose passages, findings from the protocol analysis of composing aloud suggested that a more refined examination of the recall data was warranted by the very different patterns of learning during the writing tasks. When answering study questions, students planned at a local level or from sentence to sentence in order to state correct answers to the series of questions. This suggests that although answering questions required some manipulation of important information in the passages, the students considered the information in isolated bits. During notetaking students simply translated thought into words rather than reordering information from the prose passages. Essay writing, on the other hand, required that the students, in the course of examining evidence and marshalling ideas, integrate the important information into their knowledge of the topic. These features of the students' writing behavior (e.g. amount and type of planning) seem related to deep processing (Craik & Lockhart, 1972) of the most important information in the prose passages.

The Present Study

To explore the recall data in a new direction, an analysis

was carried out to examine the effects of the three writing tasks on the students' learning of the most important information in the passages. Specifically, the study investigates the effects of the writing tasks (notetaking, answering study questions, and analytic essay writing) on the recall of content and relationship units found at the highest levels of the content structure of prose passages (Meyer, 1975).

Since all 21 passages from the initial study were analyzed for hierarchical structuring of information using the text-analytical procedures of Meyer (1975), the highest, the middle, and lowest levels of information were easily determined. The students' recalls of information at the three importance levels were analyzed to examine the contrasts in recall of the most important information (highest levels), moderately important information (middle level), and least important information (lowest levels) in the content structure. Level consisted of all rhetorical predicates and embedded content from the prose passages occurring at the same level in the hierarchy.

All factors in the analysis were within-subject: writing task (notetaking, study qeustions essay); passage-specific knowledge (much and little); and level of importance in the content structure (high, middle, and low). Thus the design was a

3 x 2 x 3 factorial with repeated measures. Dependent measures included the proportion of content units and relationship units recalled.

Each recall protocol was rescored for the presence or absence of content units and relationship units at the three levels of the content structure. Scores for recall are the proportion of the number of content units and relationship units the students recalled out of possible content units and relationship units. Since recall of relationship units as distinguished from content units was of interest, a separate analysis of each dependent variable was performed. Such an analysis was appropriate given the fact that relationship units and content units are conceptually two different variables (Meyer, 1975) and that the interrelationship between the variables indicated a moderate but statistically insignificant amount of redundancy.

Results

Table 1 presents the within-subject results for recall of relationship and content units. There was no significant main effect for task or passage-specific knowledge on recall of relationship units. Level of importance had a significant main effect on the recall of relationship units ($F(2,6) = 5.71$, $p<.04$), the highest level ($\bar{X}$=23.0 percent) producing a higher

mean than the middle level ($\bar{X}$=9.2) percent) and the lowest level ($\bar{X}$=11.0 percent). The interaction effect of level and task for recall of relationship units was also significant ($F(4,4)= 10.30$, $p<.02$) with essay writing ($\bar{X}$=37.0 percent) producing the highest means at the highest level of the content structure compared to study questions ($\bar{X}$=20.1 percent) and notetaking ($\bar{X}$=12.0 percent).

There were no significant main or interaction effects for task or passage-specific knowledge for recall of content units. Level of importance only approached significance for the recall of content units ($F(2,6) = 4.59$, $p<.06$), with the highest level ($\bar{X}$=28.1 percent) producing a higher mean than the middle level ($\bar{X}$=15.5 percent) and the lowest level ($\bar{X}$=17.2 percent).

Insert Table 1 about here

Discussion

The data suggest that the level of importance of relationship units in the prose passages influenced the students' ability to recall those relationships. Moreover, the fact that the interaction of task and level was significant indicates that when students wrote essays they learned the most important information

in the passages more often than when they engaged in more simple writing tasks such as answering study questions and notetaking.

The composing aloud data collected as part of the initial study suggested that, in general, essay writing required more manipulation of the information in the passages than did the other two tasks. The analysis of the recall data extends and corroborates the notion that because essay writing requires global planning which entails manipulating the most important information in the passage that information is more likely to be learned than the less important information. The rhetorical structures for essay writing such as thesis and support, cause and effect, and comparison and contrast seem to operate as "prose schema" that specify relationships among concepts. This would explain why essay writing enabled the students to recall relationship units at the highest levels of the passages' content structures.

By examining some of the think-aloud data we can see how reasoning about the prose passages changes when Andy moves from essay writing to answering study questions. In composing an essay, Andy attempts to integrate specific information in a passage on Nixon's wage and price freeze with his own understanding of economic policy. "Well, I guess what I have to

decide is that Nixon's proposal wasn't right. . . I guess this shows that during the war it's pretty difficult for the economy to always be up because the government disturbs the normal flow." Andy is exploring reasons WHY THE ECONOMY DECLINED which represents the proposition at the highest level of the content structure of the passage about which he is writing. On the other hand, when Andy answered a study question about a passage on "The Arms Race", he focused on isolated bits of information rather than on the construction of relationships among ideas. "If neither country wants a nuclear arsenal, why do the United States and Russia continue to develop them? I'll just say self-defense." Since answering the study questions requires only specific information, Andy does not integrate his knowledge with the information referred to in the question. Rather than requiring a reasoned explanation, the question asks for merely a recording of specific facts.

The results of this study suggest that measures of general recall of information may not be sensitive to what students learn when they write essays about information in prose passages. While the effects of tasks which emphasize repetition or summarization (notetaking) may lead to general effects on recall, writing that emphasizes extensions and applications of only the

most important information in prose passages may actually depress recall of information at the lowest levels. This is borne out by the results of the analysis. In order to measure the effects of complex tasks such as essay writing which require that the writer select the more important information from a prose passage and formulate new relationships with that information, tests of application or elaboration on that information may also be more appropriate than general recall.

Table 1

Effects of Task and Level of Importance on Recall

Means
(Standard Deviations)

Writing Task:	Notes						Questions						Essay					
Knowledge	Little			Much			Little			Much			Little			Much		
Passage Level:	H$_a$	M$_b$	L$_c$	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L
Recall % Relationship Units	14.0	41.3	88.0	96.2	17.0	12.1	16.0	75.0	63.0	25.0	63.0	15.0	35.1	44.0	14.0	38.3	16.1	23.1
	(10.0)	(64.2)	(15.0)	(20.0)	(16.0)	(23.0)	(18.0)	(21.2)	(18.0)	(26.0)	(15.1)	(35.0)	(12.0)	(82.1)	(39.0)	(13.0)	(28.0)	(33.0)
Content Units	20.1	11.4	27.1	18.0	24.3	19.3	20.0	17.0	50.0	34.0	11.0	13.2	37.0	14.0	14.0	40.0	16.0	25.0
	(15.0)	(11.0)	(31.3)	(10.3)	(12.1)	(24.0)	(19.2)	(16.0)	(14.1)	(23.3)	(12.0)	(21.0)	(18.0)	(12.5)	(26.0)	(18.3)	(15.0)	(25.2)

^{a}high; ^{b}middle; ^{c}low

	F-Statistics			
	Task	Knowledge	Level	Interaction (Task x Level)
	F (2, 6)	F (1, 7)	F (2, 6)	F (4, 4)
Relationship Units:	1.55	3.90	5.71*	10.30*
Content Units:	1.25	1.50	4.59	2.35

All statistics are for Within-Subject Analysis

* $p < .05$

References

Anderson, R. C. & Biddle, W. B. (1975). On asking people questions about what they are reading. In G. Bower (Ed.), Psychology of Learning and Motivation (Vol. 9). New York: Academic Press.

Andre, T. (1979). Does answering higher-level questions while reading facilitate productive learning? Review of Educational Research, 49(2), 280-318.

Applebee, A. N. (1984). Writing and reasoning. Review of Educational Research, 54(4), 577-596.

Craik, F. I. M. & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. Journal of Verbal Learning and Verbal Behavior, 11, 671-684.

Flower, L. & Hayes, J. R. (1984). Images, plans and prose: The representation of meaning in writing. Written Communication, 1(1), 27-44.

Graves, D. (1983). Writing: Teachers and children at work. Exeter, NH: Heinemann Educational Books, Inc.

Humes, A. (1983). Research on the composing process. Review of Educational Research, 53(2), 201-215.

Kintsch, W. (1974). The representation of meaning in memory. Hillsdale, NJ: Erblaum.

Langer, J. A. (1984a). The effects of available information on responses to school writing tasks. Research in the Teaching of English, 18(1), 27-44.

Langer, J. A. (1984b). Examining background knowledge and text comprehension. Reading Research Quarterly, 19(4), 468-481.

Meyer, B. (1977). What is remembered from prose. In R. Freedle (Ed.). Discourse production and comprehension. Norwood, NJ: Ablex.

Meyer, B. (1975). The organization of prose and its effects on memory. Amsterdam: New Holland.

Newell, G. E. (1984). Learning from writing in two content areas: A case study/protocol analysis. Research in the Teaching of English. 18(3), 265-287.

Reder, L. M. (1980). The role of elaboration in the comprehension and retention of prose: A critical review. Review of Educational Research, 50(1), 5-53.

Rickards, J. P. (1979). Adjunct post questions in text: A critical review of methods and processes. Review of Educational Research. 49(2), 181-196.

Smith, F. (1982). Writing and the writer. New York: Holt, Rinehart and Winston.

Figure 1

Synopsis of a Prose Passage: "The Arms Race"

Since the end of World War II, the United States and Russia have challenged each other for world leadership. This has brought about a dangerous and costly arms race between the two countries. Today, the two countries are about equal in overall military strength. But future technical advances could dip the balance, and many people believe that the arms race will continue well into the future. If neither country wants to use their nuclear arsenals, why does the arms race continue? One asnwer may be the contrasts in political beliefs of the United States and the Soviet Union. Critics of the arms race claim that war between the two countries would end in total destruction. Other people favor continued heavy defense spending for reasons of security. Peace can be maintained only if the superpowers fear one another.

Figure 2

Examples of Prompts and Student Responses

for the Three Writing Tasks

Notetaking
(No specific assignment given for notetaking. The students were asked to use the notetaking as a way to learn the information in the passage.)

Notetaking on the "Criticisms of the New Deal"

Criticism of a New Deal

Conservatives-alarmed of New Deal
program, 1 billion dollars spent on relief programs.
Costing government more than received taexs.
Irresponsible-spending a lot of money

(CWA) Civil works administration
(WPA) Work Progress administration
(AAA) Agricultural adjustment act

Study Questions: "The Arms Race"

1. How could advanced technology upset the balance of power between the United States and Russia?

> If one of the two countries get superior weapons then they would have the edge.

2. Why are the United States and Russia the only nations involved in an arms race?

> Because they have the population necessary to be able to produce a great amount of military weapons. Also they had a common cause in that they both felt a strong need to support their form of govt.

3. What has brought about an arms race between the United States and Russia?

Their conflicting forms of govt.

4. Why do the different political beliefs between the United States and Russia cause fear and suspicion of one another?

There's an insecurity between the two nations because they fear the other nations might have the better forms of govt.

5. If neither country wants a nuclear arsenal, why do the United States and Russia continue to develop them?

As a means of self-defense.

6. What could happen to the economies of the two countries if they continue the arms race?

It would stimulate the economy by producing a greater access of jobs.

Essay Writing: "The Arms Race"

Using the information in the passage as well as other information from other readings, TV, movies, other people, etc., write an essay stating your opinion about some people's suggestion that the U.S. disarm unilaterally. How would such a decision to alter the balance of power affect the future of the Untied States and its citizens?

Student Essay

The Arms Race

One of the solutions to the Arms Race that has been suggested is that the U.S. should disarm unilaterally, thus removing Russia's need for a Nuclear Arsenal. Ever since World War II both the United States and Russia have been building nuclear arms at a fantastic rate to the point that the two countries have the capacity to destroy the world many times over. Clearly, having more than you could possibly use is ridiculous, but we build more weapons to keep up with the Russians and Russia builds more weapons to keep up with us. And while both of us consider using nulcear arms unthinkable, we are both afraid of being behind the other. Therefore, many people feel that we should take the initiative completely or the race shall go on indefinitely and drain the world of much needed resources.

However, while this looks fine in theory, can this really work in the real world? Will Russia follow our lead and also disarm? And if so, will they disarm fast enough tosatisfy us? These equestions, and others, must be answered before we can decide if unilateral disarmament is feasible.

One of the problems with unilateral disarmament is the reason why it started in the first place; both sides distrust each other. As we asked before, will Russia believe we have disarmed? It is unlikely, given Russia's past xenophobia, they would wonder if our weapons can destroy them at a later date.